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Appl. No. 10/695,367
Amdt. dated 5/21/08
Reply to Office action of 2/21/08

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1, 3, 4 and 7-13 are now in the application and are subject to examination.

Claims 1 and 8 have been amended. Claim 5 has been canceled. No claims have been added.

In "Claim Rejections – 35 USC § 102," "Claim Rejections – 35 USC § 103," item 1 on pages 3-4 of the above-identified Office Action, claims 1, 5, 7-8 and 10-11 have been rejected as being fully anticipated by or obvious over U.S. Patent No. 5,294,300 to Kusuyama under 35 U.S.C. § 102(b) or 103 (a).

In "Claim Rejections – 35 USC § 103," item 2 on page 4 of the Office Action, claims 1, 5 and 7-12 have been rejected as being obvious over U.S. Patent No. 6,620,359 to Meza et al. (hereinafter Meza) under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 3 on page 5 of the Office Action, claims 1, 5 and 7-12 have been rejected as being obvious over Meza in view of Kusuyama under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 4 on pages 5-7 of the Office Action, claims 3-4 have been rejected as being obvious over Meza in view of Kusuyama and further in view of U.S. Patent Application Publication No. US 2002/0033247 to Neuschutz et al. (hereinafter Neuschutz) under 35 U.S.C. § 103(a).

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In "Claim Rejections – 35 USC § 103," item 5 on page 7 of the Office Action, claims 1, 7-9 and 11 have been rejected as being obvious over Japanese Abstract JP 63-023993 to Doi et al. (hereinafter Doi) under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 6 on pages 7-9 of the Office Action, claims 1, 5 and 7-11 have been rejected as being obvious over the Energy Conversion article to Xiao et al. (hereinafter Xiao) in view of German Published, Non-Prosecuted Patent Application DE 196 30 073 A1 to Eska et al. (hereinafter Eska) under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 7 on page 9 of the Office Action, claims 3-4 have been rejected as being obvious over Xiao in view of Eska and Neuschutz under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 8 on page 10 of the Office Action, claims 12-13 have been rejected as being obvious over Xiao in view of Eska and either U.S. Patent No. 5,882,570 to Hayward or U.S. Patent No. 3,361,684 to Chavatal et al. (hereinafter Chavatal) under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 9 on pages 10-11 of the Office Action, claims 1, 5 and 7-12 have been rejected as being obvious over the thesis to Bader in view of either Eska or U.S. Patent No. 6,130,265 to Glueck et al. (hereinafter Glueck) under 35 U.S.C. § 103(a).

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In "Claim Rejections – 35 USC § 103," item 10 on page 12 of the Office Action, claims 3-4 have been rejected as being obvious over Bader in view of either Eska or Glueck and further in view of Neuschutz under 35 U.S.C. § 103(a).

In "Claim Rejections – 35 USC § 103," item 11 on pages 12-13 of the Office Action, claim 13 has been rejected as being obvious over Bader in view of either Eska or Glueck and further in view of Chavatal under 35 U.S.C. § 103(a).

The rejections have been noted and the claims have been amended in an effort to even more clearly define the invention of the instant application.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful. Claim 1 calls for, inter alia, a material mixture, comprising:

an amount of a phase change material and an amount of particulate expanded graphite mixed with said phase change material,

wherein the expanded graphite is present in an amount of 5 to 40% by volume and is formed of particles comprising comminuted, compacted expanded graphite product with a bulk density of from 60 to 200 g/l and a mean particle diameter of 5 μ m to 5 mm.

Independent claim 8 contains similar language.

Regarding items 1, 3 and 4 of the Office Action, in which the newly-cited Kusuyama reference was applied, it is noted that Kusuyama discloses a method for production

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of an expanded graphite material that is to be used in the field of heat resistant, asbestos-free graphite sheets as gaskets or seals (see column 1, lines 8 to 13 of Kusuyama). In order to produce the graphite sheets, expanded graphite is to be mixed with fibers in a wet paper making process. The problem that is to be solved by the Kusuyama process is the floating of the expanded graphite on the surface of the water suspension (see column 2, lines 6 to 17 of Kusuyama). As a solution to that problem, Kusuyama proposes suspending ground compacted expanded graphite in water. However, after the wet laying process, the formed sheet has to be dewatered, dried and heated to complete the process (see example 1 in column 5, lines 25-35 of Kusuyama).

It is therefore respectfully noted that the opinion of the Examiner that the water mentioned in Kusuyama would act as a phase change material (PCM) in the material described in Kusuyama, is incorrect. The water is completely removed from the product and serves only as a re-expansion aid.

Regarding items 2, 3 and 4 of the Office Action, in which the newly-cited Meza reference was used, it is noted that Meza suffers from the same deficiencies as Kusuyama. Meza describes a method of recycling flexible graphite. Flexible graphite consists of compacted expanded graphite flakes. Meza proposes a thermal re-expansion in order to improve already compacted and then ground expanded graphite. That is to be done by absorption of water and thermally shocking the water soaked particles (see column 2, lines 47-56 and column 2, line 66 to column 3, line 3 of Meza). Meza cites gaskets and insulative material as

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applications for the material which is obtained (see column 1, lines 60-62 and column 3, lines 20-23 of Meza).

Since the water is removed from the product described in Meza, there is no reason that it would or could act as a PCM.

Regarding items 9, 10 and 11 of the Office Action, in which the newly-cited Glueck reference was used, it is noted that Glueck discloses a process for preparing expandable styrene polymers containing graphite particles. Nowhere in that document is expanded graphite or PCM mentioned. Even if one skilled in the art would assume that the described graphite covers expanded graphite (see column 3, lines 1-4 of Glueck) there exists no hint or suggestion that a heat storage material is formed thereby. The aim of Glueck is to provide a material with improved thermal insulation properties from polystyrene foams with densities of 5 to 35 g/l (see column 3, lines 20-23 of Glueck).

Regarding items 5, 6 and 9 of the Office Action, in which claims 1 and 8 and several dependent claims have been rejected over Doi or Xiao in view of Eska or Bader in view of Eska or Glueck, and the Response to Arguments, it is noted that Applicants accept that a particle size of expanded graphite in the range of 5 microns to 5 mm is not new and is described in the cited state of the art. However, Applicants are not merely claiming a specific particle size. Rather, Applicants are claiming a mixture with specific properties that comprises not only expanded graphite but comminuted, compacted expanded graphite of the claimed bulk

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density and particle size.

This comminuted, compacted expanded graphite recited in claims 1 and 8 of the instant application is not comparable with the graphite described in the cited references because the properties change by compacting the expanded graphite and comminuting it afterwards. It is not possible to again obtain the same properties of natural graphite in that way. The particle size may be in the same range, but the properties of the graphite are different, especially with regard to the adsorption ability of the phase change material (PCM).

More specifically, as already mentioned in the Amendment filed November 21, 2007, Eska describes the use of commercially available expanded graphite, not comminuted, compacted expanded graphite as claimed in the instant application. According to Eska, the expanded graphite is formed into compacted bodies and then the graphite bodies are impregnated by evacuation and pressure infiltration with molten PCM.

It was also explained in the Amendment filed November 21, 2007 that Doi does not disclose comminuted, compacted expanded graphite as claimed in the instant application.

The products produced by the different methods lead to different properties of the products which are obtained. The mixture claimed in the instant application shows more isotropic behavior than infiltrated graphite bodies, because forming the

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graphite bodies from expanded graphite leads to an orientation of the graphite flakes (see the comparison of the thermal conductivity from the perpendicular to parallel directions of pressing for an infiltrated foil versus an example according to the invention in table 1 on page 23 of the Specification of the instant application). Further advantages of the claimed mixture are:

- a) the ability to obtain good mixtures with PCM that could not be infiltrated in a sufficient manner; and
- b) the possibility to fill the mixture into cavities of various shapes, which is especially important for the production of heat storing devices.

Therefore, although the particle size and volume range of the claims overlap with the state of the art, due to the usage of comminuted, compacted expanded graphite, a different product results.

The Neuschutz and Chavatal references applied against the dependent claims do not overcome the deficiencies of the references described in detail above.

Clearly, the prior art does not show:

a mixture of phase change material and

particulate expanded graphite in an amount of 5 to 40% by volume, formed of particles comprising comminuted, compacted expanded graphite product with a bulk density of from 60 to 200 g/l and a mean particle diameter of 5 μ m to 5 mm.

as recited in claims 1 and 8 of the instant application.

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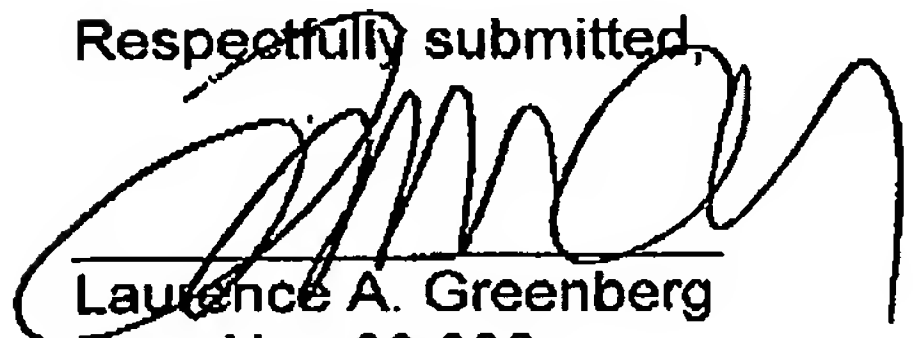
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It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 1 and 8. Claims 1 and 8 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1.

In view of the foregoing, reconsideration and allowance of claims 1, 3, 4 and 7-13 are solicited. In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested, as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

Please charge any other fees that might be due with respect to Sections 1.16 and 1.17 to Deposit Account Number 12-1099 of Lerner Greenberg Sterner LLP.

Respectfully submitted,



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LAG/lq

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